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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Gebhardt, et. al.	:	Group No.: 2881
Serial No.: 10/031,542	:	Examiner: Phillip A. Johnston
Filed: January 18, 2002	:	Confirmation No. 6594

For: Method and Device for Cluster Fragmentation

BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Real party in Interest

Applicants' real party in interest is:

Max-Planck Gesellschaft zur Förderung der Wissenschaften e.V.
Hofgartenstrasse 8
D-80539
München, Germany

Related Appeals and Interferences

Applicants, Applicants' assignee and Applicants' legal representative are unaware of any appeals or interferences that are related to the instant appeal, or that will affect, be affected by or have any bearing on the Board's decision in the instant appeal.

Status of the Claims

Claims 1 to 21 are canceled. Claims 22 to 52 are currently pending. Claims 22 to 52 are rejected under 35 U.S.C. § 103(a). The rejection of Claims 22 to 52 is appealed.

Status of Amendments

All amendments to the claims in the application have been entered.

Summary of the Claimed Subject Matter

The presently claimed invention is a method for cluster fragmentation. The claimed method comprises the steps of (1) producing a neutral cluster comprising a carrier substance comprised of polar molecules, where the cluster contains at least 10 such molecules; (2) loading the neutral cluster with at least one reaction partner that is chemically different from the carrier substance; (3) the at least one reaction partner forms at least one pair of electrically differently charged charge carriers within the cluster, either spontaneously or excited from the outside; and (4) fragmenting the cluster into a plurality of cluster fragments, such that at least one positively charged and at least one negatively charged cluster fragment is formed during the fragmentation such that at least one reaction partner is part of at least one fragment after the fragmentation and the cluster fragments are spatially separated.

Exemplary polar molecules, i.e. molecules having their own dipole moment, that are used as the carrier in the clusters in the present invention are described at page 7 of the instant specification. Exemplary polar molecules include water (H_2O), SO_2, NO_2, NH_3, SF_n, CH_3CN, $CHClF_2$ and isobutene. The clusters themselves are described in the instant specification at page 6 as being groups of atoms or molecules that are weakly bonded by purely physical forces. Further, the clusters themselves are neutral, i.e. do not carry a net positive or negative charge. The clusters comprise at least ten of such molecules, but may contain many more.

The reaction partner that is loaded into the neutral cluster is a neutral molecule or atom, which is capable of forming a pair of differently charged charge carriers, i.e. a pair comprising positive and negative charge carrier. Further, the reaction partner is chemically different from the

polar molecules making up the clusters. Preferred reaction partners for use with polar carrier substances are described at page 8 of the instant specification. Exemplary reaction partners are alkali atoms such as lithium, sodium, potassium and cesium, which have low ionization potentials. However, other reaction partners may be used. In another example, the carrier substance making up the clusters may be a strong base and the reaction partner a strong acid. In the case where ionization occurs by abstraction of an electron or proton, which have high movability within the cluster, the resulting positively and negatively charged charge carriers may efficiently become separated within the cluster.

The loading with the reaction partner may occur during cluster formation, via a gas phase after cluster formation, or at a boundary surface just prior to cluster fragmentation. Where loading occurs at a boundary surface, the boundary surface may be coated with the reaction partner adsorbates, which are transferred to the cluster prior to fragmentation.

The fragmentation of the neutral clusters occurs generally occurs through energy input. Energy input may be by mechanical means, such as by collision with a solid or liquid boundary surface. Alternatively, energy input may be by means of radiation energy, such as by exposure of the clusters to laser radiation.

Grounds for Rejection to be Reviewed on Appeal

The Examiner's rejection of Claims 22 to 52 under 35 U.S.C. § 103(a).

Argument

Applicants respectfully submit that the Examiner has made several errors in his rejection of Claims 22 to 52. In the first instance, Applicants respectfully submit that the Examiner has misinterpreted the references, substituting his own knowledge for the teachings of the references. Applicants respectfully submit that the references do not disclose what the Examiner asserts they

disclose. The Examiner has instead relied on his knowledge of the Applicants' invention to read disclosure into the references. Second, even if the Examiner's interpretations of the references were correct, in attempting to make out a *prima facie* case of obviousness, the Examiner has used hindsight reconstruction to combine the teaching of the three cited references U.S. 4,845,367 ("Amirav"); U.S. 4,755,344 ("Friedman"); and U.S. 4,851,669 ("Aberth") where those references provide no motivation to combine their teachings. The Examiner also has not shown the requisite reasonable expectation of success in combining the references' teachings. In fact, the Examiner has ignored explicit disclosure in the references which militate against a reasonable expectation of success.

Because the Examiner has not shown a motivation to combine the references or reasonable expectation of success, and has further improperly combined references, a *prima facie* case of obviousness of the instant claims has not been established. Applicants therefore respectfully request that the rejection of Claims 22 to 52 under 35 U.S.C. § 103(a) be overturned.

I. The Applied References

As stated above, the Examiner has cited three diverse references in an attempt to locate all of the features of Claims 22 to 52. Applicants respectfully submit that the references do not disclose each and every feature as they are found in Claims 22 to 52, and further that it is improper to combine the references as the Examiner proposes. This will be made clear by a brief review of the references.

A. U.S. 4,845,367 ("Amirav")

Amirav discloses a method for producing ions by surface ionization. In Amirav, the substance to be ionized is seeded into a light gas carrier, e.g. hydrogen or helium. Although Amirav states at column 2, line 3, that "theoretically, any gas can be used a carrier gas", Amirav

further states directly after this that lighter gases are preferred since they produce the highest kinetic energy. The substance to be ionized is sent first to a heating element and is then accelerated through a supersonic nozzle, and then directed at a surface to induce molecular fragmentation or dissociation.

In the example provided in Amirav at column 3, line 54, n-propyl iodide molecules are ionized by seeding into a hydrogen supersonic beam. It should be noted that the boiling temperature of n-propyl iodide is approximately 101-102° C. It is stated at column 3, lines 63 to 65 that the regular working temperature in the example was maintained at 200° C to ***minimize*** thermal dissociation or ***cluster formation***. However, Amirav reports at column 4, line 66 to column 5, line 3, that based on the mass spectrum produced in the example, it was believed that a small number of clusters of n-propyl iodide were formed. Amirav also reports the occurrence of butyl positive ions, which are the result of an impurity in the substance to be analyzed.

B. U.S. 4,755,344 ("Friedman")

Friedman discloses a method of producing cluster ions, preferably isotopic hydrogen cluster ions. Friedman further discloses at column 1, lines 48 to 63 that in the prior art neutral clusters were normally formed at room temperature. At column 2, lines 3 to 26, Friedman discloses that they have found that clusters are best formed by cooling a gas to around its boiling point. In the disclosed method, large cluster ions are produced by expansion of the cooled gas through a supersonic nozzle.

At column 3, line 30, Friedman discloses that the cooled gas, containing ions and electrons, is expanded through a supersonic nozzle from a region of high pressure to a region of low pressure. The ions in the gas act as seeds, around which the clusters more readily form. The ions are generated prior to the nozzle by introducing a charge via an arc wire to produce a

plasma, ionized gas. At column 5, lines 54 to 55 Friedman states, "[t]he combination of the ionizing means with the supersonic nozzle 50 is critical to the present invention."

Friedman provides several examples of its disclosed invention. All examples used an apparatus similar to that shown in Friedman's Figure 1, which includes an arc wire 60 for producing ions during formation of the clusters. Examples I and II describe formation of hydrogen clusters using pure hydrogen cooled to 35 K, or - 238° C. Example III uses deuterium gas cooled to 25 K, - 248° C. Example IV was run using a combination of helium containing 5% nitrogen, which was cooled to 77 K, - 196° C. Example V was run using nitrogen containing 1 to 3% water vapor, and was done at room temperature, approximately 25° C. All examples, except example V required cryogenic cooling.

At column 1, lines 28 to 47, Friedman discloses various applications for cluster ions. None of these uses includes a use as a carrier substance or fragmenting a neutral cluster.

C. U.S. 4,851,669 ("Aberth")

Aberth discloses a tandem mass spectrometer including an ion source, a first mass analyzer, a microchannel collision plate, a second mass analyzer and a detector. The ion source is described as being selected from a number of methods disclosed at column 4, lines 30 to 60. One technique disclosed is so-called fast atom bombardment (FAB) or liquid SIMS (secondary ion mass spectrometry). In this technique a neutral or ionic beam is directed at a target comprising a substance to be ionized dissolved in a viscous liquid solvent.

The experimental section of Aberth, at column 8, line 8, describes the use of a cesium ion gun, a Cs^+ beam, to produce sputter ions of a sample either dissolved in a glycerol matrix (peptides) or coated on a substrate (cesium fluoride or iodide). The sputter ions are subsequently fragmented.

II. <u>The Examiner has Misinterpreted the References</u>

In various places in the Office Action issued November 28, 2005 (the "Action"), the Examiner makes various representations about the disclosures of the cited references which the Applicants believe are clearly incorrect.

A. <u>Amirav does not Disclose Cluster Formation</u>

The Examiner's obviousness analysis is predicated on the Examiner's conclusion that Amirav teaches formation of clusters of n-propyl iodide. See Action pages 12-13. In particular, at page 4 of the Action, the Examiner asserts that Amirav discloses impinging clusters on solid surfaces to initiate reactions, referencing column 1, lines 48 to 58 and column 2, lines 43 to 65. However, Amirav only contains a single isolated reference which in essence states that a small number of clusters might have been formed in one instance. "A trace amount (0.2 percent) of parent ion peak (M=170) and $(propyl)_2I^+$ (m=213) ions, ***which we <u>believe</u> are due to clusters of propyl iodide molecules***, was also observed." Amirav, column 4, line 66 to column 5, line 1 (emphasis added). The broader teaching of Amirav clearly shows that cluster formation and fragmentation **<u>is not a goal of the disclosed invention</u>**, and that cluster formation **<u>is to be minimized</u>**. This is particularly clear when Amirav is compared to Friedman, which states that cluster formation is performed by cooling a gas around its boiling temperature. In contrast, the working temperature in Amirav's example is well above the boiling temperature of the analyte. Indeed, this temperature is used by Amirav for the express purpose of minimizing cluster formation.

Applicants respectfully submit that the Examiner has used hindsight reasoning based on the Applicants' disclosure to conclude that Amirav discloses cluster formation. A review of the Examiner's Response to Arguments shows the hindsight nature of the analysis. "The Examiner

has interpreted from a comparison of the applicant's disclosure and the Amirav (367) references [sic] above, that both the applicant and Amirav (367) use equivalent apparati [sic] to form neutral clusters via expansion of a carrier gas through a nozzle and both subsequently ionize the neutral clusters to form cluster ions after impact with a target material, as known in the prior art per the Friedman (344) reference." Action at pages 11-12. The Examiner has essentially used the Applicants' disclosed invention to read the disclosure of cluster formation into Amirav by determining that there are similarities between the apparatus of Amirav and Applicants' disclosed apparatus. This conclusion completely disregards Amirav's express teaching to minimize cluster formation.

At page 6 of the Action, the Examiner asserts that Aberth it is known to direct neutral clusters at a target to generate ions, citing column 4, lines 20 to 40. The cited section discloses directing a neutral or ionic beam at a target to generate ions, so-called fast atom bombardment. The reference does not disclose directing neutral clusters at a target. If the Examiner believes that this feature is inherent in Aberth, he has not demonstrated such inherency by reference to the prior art or through technical reasoning as required. See *Ex parte Levy*, 17 USPQ2d 1461 (Bd. Pat. App. & Inter. 1990).

III. Rejection of Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52

The Examiner has rejected Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 as obvious over the combination of Amirav and Friedman. Specifically, the Examiner asserts that it would have been obvious to modify the method taught by Amirav by using a carrier gas containing water molecules as taught in Friedman to provide a method for generation of large cluster ions. See Action at page 5. The Examiner has however not pointed to any teaching in Amirav, Friedman or the prior art in general that would motivate one to make this modification,

or provide a reasonable expectation of success in doing so. Also, the fact that the proposed modification of Friedman would render Friedman inoperative has been ignored. Further, the Examiner's analysis is based on hindsight reconstruction of the Applicants' invention based on the Examiner's review of the Applicants' disclosure. Applicants respectfully submit that the proposed modification of Amirav with Friedman is therefore improper, and that a *prima facie* case of obviousness has not been established.

A. <u>The Examiner has not Provided any Motivation or Reasonable Expectation of Success in Modifying Amirav with Friedman</u>

M.P.E.P. 2143 states that three basic criteria must be met to establish *prima facie* case of obviousness. First, there must be some motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the cited references must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed combination, and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d, 1438 (Fed. Cir. 1991).

In the first instance, the Examiner's obviousness analysis, which spans pages 2 through 5 of the Action contains only a recitation of the elements the Examiner asserts are present in Amirav and Friedman, which the Examiner believes correspond to the elements in Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52. This is followed by an unsupported assertion that it would be obvious to modify the method of Amirav by providing a carrier gas containing water molecules as disclosed by Friedman. Nowhere does the Examiner point out the requisite motivation or reasonable expectation of success in making the proposed modification of Amirav. Even if the Examiner has located all of the elements of the above claims in Amirav and

Friedman, it is incumbent upon the Examiner to provide some rationale as to why a person having ordinary skill in the art would, without knowledge of the instantly claimed invention, combine the elements of Amirav and Friedman as the Examiner has done.

MPEP 2144 explicitly requires the presentation of a rationale found "expressly or impliedly in the prior art or drawn from a convincing line of reasoning based on established scientific principles or legal precedent" in order to combine references under Section 103. Further, MPEP 2142 states that, "[t]o reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made." These dual requirements ensure that an examiner does not fall into the trap of using hindsight based on his own knowledge of the Applicant's disclosure to reconstruct the claimed invention from the prior art.

To avoid such hindsight reconstruction, the CAFC requires "a rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." *In re Beasley* 117 Fed.Appx. 739, 742 (Fed. Cir. 2004). "This is consonant with the obligation of the Board [of Patent Appeals and Interferences] to develop an evidentiary basis for its factual findings to allow for judicial review under the substantial evidence standard that is both deferential and meaningful." *Id.* at 742-43. Neither an examiner nor the Board is entitled rely only on their own knowledge as skilled artisans. *Id.* at 743.

B. <u>There Is No Motivation to Combine Amirav and Friedman or Reasonable Expectation of Success Outside of the Applicants' Disclosure</u>

As stated above, the Examiner has failed to show any motivation to combine Amirav and Friedman, or a reasonable expectation of success in doing so. In fact, Applicants' respectfully submit, no motivation does exist in either Amirav or Friedman, or in the knowledge generally

available to one having ordinary skill in the art to make the proposed modification. Further, there is no reasonable expectation of success, for the following reasons.

1. The Disclosures of Amirav and Friedman do not Suggest Their Combination

The Examiner asserts that it would be obvious to replace clusters formed in Amirav with those of Friedman. As stated above this assertion is predicated on the Examiner's conclusion that Amirav teaches formation of clusters of n-propyl iodide. See Action pages 12-13. However, Amirav only contains a single speculative reference which in essence states that a small number of clusters might have been formed in one instance, as cited above. Further, this analysis ignores the broader teaching of Amirav, which is to **minimize cluster formation**. Amirav, column 3, lines 63 to 65.

"[It] is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of what other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art." *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448 230 USPQ 416, 419 (Fed. Cir. 1986); *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ.2d 1780, 1784 (Fed. Cir. 1992) ("[An examiner] cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.").

Applicants respectfully submit that the Examiner has chosen an isolated reference in Amirav to support his position, while ignoring the broader teachings of Amirav, which do not support the Examiner's position.

Nonetheless, to the extent that Amirav does disclose any cluster formation at all, the clusters are formed by a substance to be analyzed, not a carrier gas. There is absolutely no suggestion in Amirav of a benefit to providing clusters, neutral or otherwise to be used as a

carrier for a substance to be analyzed. Similarly, there is no suggestion in Amirav to provide a carrier gas containing water molecules such as that in Friedman. Also, there is no disclosure in Friedman that the cluster ions formed by its method would be useful as a carrier for a substance to be analyzed by a method such as that disclosed in Amirav. The motivation to combine these two elements instead comes from the Applicants' disclosure. Specifically, at page 8 of the Action, the Examiner points to Applicants' own disclosure of substances suitable for cluster formation, which includes water molecules. The Examiner then refers to the blanket statement in Amirav that "theoretically" any gas can be used as a carrier gas. This leads the Examiner to the conclusion that one skilled in the art would find it desirable to modify Amirav to include a carrier gas containing water molecules as disclosed by Friedman. However, the motivation to do so has been identified in the Applicants' disclosure, not in Amirav or Friedman.

Applicants respectfully submit that this is precisely the type of hindsight reconstruction, based on the Applicants' disclosure, that the CAFC has repeatedly held to be improper. See *Teleflex, Inc. v. KSR International Co.*, 119 Fed.Appx. 282, 285-86 (Fed. Cir. 2005) ("Combining prior art references without evidence of...a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight.")

2. <u>The Examiner has not Provided a Convincing Line of Reasoning Based on Established Scientific Principles or Legal Precedent</u>

Absent some teaching or suggestion in the prior art itself, the Examiner is required to show a convincing line of reasoning based on established scientific principles or legal precedent to provide motivation to combine references. In his Response to the Applicants' arguments, pages 7 to 13 of the Action, the Examiner makes several assertions about what he believes the references disclose, based on his own interpretation of them. However, as stated in *Beasley*,

neither an examiner nor the Board is entitled rely only on their own knowledge as skilled artisans. *In re Beasley*, 117 Fed.Appx. at 743. Nonetheless, even if the Examiner's interpretation of what the references disclose is correct, he has not provided a reasoned analysis to show why one of ordinary skill in the art would be motivated to combine their teachings. The simple fact that the Examiner believes that the gas containing water molecules disclosed by Friedman ***can*** be used with Amirav's method is insufficient to show obviousness. It is well settled that the mere fact that references can be combined is insufficient to render the resultant combination obvious. The prior art must also suggest the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

3. There is No Reasonable Expectation of Success in Combining Amirav with Friedman

Amirav teaches using a light gas, e.g. hydrogen or helium as a carrier for ionization of a substance to be ionized at hyperthermal energy. Light gases are preferred because they produce the highest kinetic energy. Amirav further teaches passing the carrier gas and substance to be analyzed through a heating element prior to passing through a supersonic nozzle. Amirav specifically discloses operating its method at a temperature significantly above the boiling point of an analyte for the express purpose of avoiding cluster formation. In contrast, Friedman discloses cooling a gas to significantly below its boiling point prior to passing through a supersonic nozzle to promote cluster formation. At best, Freidman discloses operating at room temperature with 1 to 3% water vapor in nitrogen, still well below the boiling temperature of water.

The teachings of Amirav and Friedman are therefore in direct conflict. According to the teaching of Friedman, one would need to cool the carrier gas an substance to be analyzed prior to the supersonic nozzle, not heat it as taught by Amirav. Further, the conditions taught by Amirav

would not be expected to cause cluster formation, but rather prevent it in the gas taught by Friedman. Therefore, even if one were to use the water containing gas disclosed by Friedman in the method of Amirav, one would not expect significant cluster formation.

Further, Friedman specifically discloses a method for providing cluster ions. An arc wire is used to create ionized gas prior to passing a gas through a supersonic nozzle. It is the "seed" ions in the ionized gas that induce cluster formation. As stated in Friedman, "[t]he combination of the ionizing means with the supersonic nozzle 50 is critical to the present invention." Friedman, column 5, lines 54-55. Modification of Friedman to provide neutral clusters rather than cluster ions would require the elimination of the critical element of the ionizing means. This modification would not only change the principle of operation of Friedman, but would also render it unsatisfactory for its intended purpose, to provide cluster ions. Indeed, according to the disclosure of Friedman, elimination of the ionizing means could well render Friedman inoperable since it is the ionizing means that makes cluster formation possible. For this reason also, one would not reasonably expect the use of the water containing gas of Friedman in the method of Amirav to result in significant cluster formation since the critical ionizing means is absent in Amirav.

C. <u>Because the Examiner has not Provided any Motivation to Combine Amirav and Friedman, and Because There Can be No Motivation to Combine Amirav and Friedman, the Rejection of Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 Should be Reversed</u>

Applicants respectfully submit that because no motivation to combine Amirav and Friedman, or reasonable expectation of success in doing so, has been shown, a *prima facie* case of obviousness of Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 has not been established. Applicants therefore respectfully request that the rejection of Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 under 35 U.S.C. § 103(a) be reversed.

IV. Rejection of Claims 30, 32, 33, 41, 44, 47 and 50

The Examiner has rejected Claims 30, 32, 33, 41, 44, 47 and 50 as obvious under 35 U.S.C. § 103(a) over the combination of Amirav, Friedman and Aberth. Specifically, Aberth is cited for the elements of (a) an alkali reaction partner, (b) a reactive surface coated with an acid or a base, and (c) reaction partner coating with a surface density whose temporal average has a predetermined value. See Action at page 5.

Applicants respectfully submit that the arguments made above with respect to the application of the combination of Amirav and Friedman to Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 apply equally to the application of the combination of Amirav and Friedman to Claims 30, 32, 33, 41, 44, 47 and 50. As Aberth does not and cannot cure the deficiencies in Amirav and Friedman above, Applicant respectfully submits that on this basis alone Claims 30, 32, 33, 41, 44, 47 and 50 cannot be obvious. Nonetheless, Applicants respectfully submit that the Examiner has not demonstrated the presence of the requisite motivation or reasonable expectation of success in the prior art to combine Aberth with either of Amirav or Friedman, or the hypothetical combination of the two.

Aberth discloses directing a beam of cesium ions from a cesium ion gun at a target substrate coated with cesium fluoride or cesium iodide. Neither Amirav nor Friedman discuss ions of alkali metals, as conceded by the Examiner. Also, there is no discussion in Aberth of loading cesium ions into clusters of water molecules or any other clusters of polar molecules. Therefore, even if the modification of Amirav to produce the water molecule clusters of Friedman were appropriate, which it is not, there would still be no motivation to further modify that combination to load those clusters with cesium ions.

Further, the Examiner's assertion that Aberth discloses of impinging cesium cluster ions on a sample coated collision plate is inapposite. This bears absolutely no relation to the purpose of Amirav or Friedman, or the proposed purpose of the Examiner's hypothetical combination of Amirav and Friedman. The Examiner's proposed combination of Friedman with Amirav is for the purpose of forming clusters of polar molecules, not metal ions. The Examiner has provided no rationale for how Aberth fits into the proposed combination of Amirav and Friedman, much less a rationale for making the combination.

For the forgoing reasons, Applicants respectfully submit that a prima facie case of obviousness of Claims 30, 32, 33, 41, 44, 47 and 50 over the combination of Amirav, Friedman and Aberth has not been established. Applicants therefore respectfully request that the rejection of Claims 30, 32, 33, 41, 44, 47 and 50 under 35 U.S.C. § 103(a) be reversed.

Conclusion

Applicants respectfully submit that for all of the forgoing reasons, a *prima facie* case of obviousness of Claims 22 to 52 has not been established. The Applicants therefore respectfully request that the Board reverse the rejection of claims under 35 U.S.C. § 103(a).

Respectfully submitted,

Matthew P. McWilliams
Agent for Applicants
Reg. No. 46,922

Drinker, Biddle & Reath LLP
One Logan Square
18th and Cherry Streets
Philadelphia, PA 19103
Telephone (215) 988-3381
Facsimile (215) 988-2757
Date: April 21, 2006

CLAIMS APPENDIX

1-21. (canceled)

22. (Previously presented) A method for cluster fragmentation comprising the steps: producing a neutral cluster comprising a carrier substance comprised of polar molecules, said cluster comprising at least 10 of said polar molecules, loading said neutral cluster with at least one reaction partner, said reaction partner being chemically different from the carrier substance, said at least one reaction partner forming at least one pair of electrically differently charged charge carriers with the carrier substance in the cluster, either spontaneously or excited from the outside, and fragmenting the cluster into a plurality of cluster fragments, such that at least one positively charged and at least one negatively charged cluster fragment is formed during the fragmentation,

and the at least one reaction partner is part of at least one cluster fragment after the fragmentation, and the cluster fragments are spatially separated.

23. (original) The method according to claim 22, further comprising the step of loading the cluster with an electrically neutral molecule.

24. (original) The method according to claim 23, wherein, said step of loading the cluster with an electrically neutral molecule comprises the steps of applying neutral molecules as an adsorbate coating to a solid body surface, and transferring said neutral molecules from the solid body surface into the charged cluster fragments.

25. (original) The method according to claim 22, wherein the cluster fragmentation occurs through collision of the cluster with a moving or static boundary surface or through direct energy input.

26. (original) The method according to claim 22, wherein the loading with the reaction partner occurs by at least one method, either alone or in combination, selected from the group consisting of; loading during the cluster production, loading during the cluster movement toward a boundary surface by interaction with at least one gas phase particle of the reaction partner, and loading during the collision with a boundary surface by absorption of reaction partner adsorbates into the cluster.

27. (original) The method according to claim 22, wherein polar molecules or molecule groups are used as the carrier substance.

28. (Previously presented) The method according to claim 22, wherein an electron transfer occurs between the carrier material and the reaction partner.

29. (original) The method of claim 28, wherein the reaction partner is a molecule or atom having low ionization energy.

30. (original) The method of claim 29, wherein the reaction partner is an alkali atom.

31. (original) The method according to claim 22, wherein a proton transfer occurs between the carrier material and the reaction partner.

32. (original) The method of claim 31, wherein the reaction partner is a strong acid and the carrier material is a strong base.

33. (original) The method of claim 31, wherein the reaction partner is a strong base and the carrier material is a strong acid.

34. (Previously presented) The method according to claim 22, wherein said step of production of said neutral cluster comprises at least one method, either alone or in combination, selected from the group consisting of; supersonic expansion of a gas and supersonic expansion of a gas mixture by means of a nozzle arrangement.

35. (original) The method according to claim 34, wherein the clusters produced are subjected to geometric beam limiting for irradiating a boundary surface according to a predetermined pattern.

36. (original) The method according to claim 22, further comprising the step of influencing kinetic energy of the charged cluster fragments by at least one method, either alone or in combination, selected from the group consisting of; subjecting the cluster fragments to an electrical field and subjecting the cluster fragments to a magnetic field, and subjecting the cluster fragments to a further fragmentation.

37. (original) The method according to claim 22, further comprising the step of subjecting the cluster fragments to a count, a mass spectroscopy examination, or a material analysis.

38. (original) The method according to claim 22, wherein the fragmentation of the cluster occurs by glancing incidence of the cluster on a boundary surface.

39. (original) The method according to claim 25, wherein the boundary surface is a gas phase/liquid or gas phase/solid body boundary surface.

40. (original) The method according to claim 39, wherein the boundary surface is formed by a solid body surface made of a metal, a semiconductor, or a dielectric.

41. (original) The method according to claim 39, wherein the boundary surface is coated with reaction partner adsorbates with a surface density whose temporal average has a predetermined value.

42. (original) The method according to claim 26, wherein the boundary surface is a gas phase/liquid or gas phase/solid body boundary surface.

43. (original) The method according to claim 42, wherein the boundary surface is formed by a solid body surface made of a metal, a semiconductor, or a dielectric.

44. (original) The method according to claim 42, wherein the boundary surface is coated with reaction partner adsorbates with a surface density whose temporal average has a predetermined value.

45. (original) The method according to claim 35, wherein the boundary surface is a gas phase/liquid or gas phase/solid body boundary surface.

46. (original) The method according to claim 45, wherein the boundary surface is formed by a solid body surface made of a metal, a semiconductor, or a dielectric.

47. (original) The method according to claim 45, wherein the boundary surface is coated with reaction partner adsorbates with a surface density whose temporal average has a predetermined value.

48. (original) The method according to claim 38, wherein the boundary surface is a gas phase/liquid or gas phase/solid body boundary surface.

49. (original) The method according to claim 48, wherein the boundary surface is formed by a solid body surface made of a metal, a semiconductor, or a dielectric.

50. (original) The method according to claim 48, wherein the boundary surface is coated with reaction partner adsorbates with a surface density whose temporal average has a predetermined value.

51. (original) The method according to claim 22, wherein the carrier substance comprises a chemical compound which has such a low electron affinity that electrons are not stably bonded to a cluster fragment.

52. (original) Method according to claim 22, said method being used:

for absorbing surface adsorbates from a surface which are to be subjected to an analysis, for absorbing impurities from solid body surfaces for their purification, or for producing charged cluster fragments from clusters and aerosols which are to be subjected to a charge measurement or mass spectrometry analysis.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

Applicants, Applicants' assignee and Applicants' legal representative are unaware of any appeals or interferences that are related to the instant appeal, or that will affect, be affected by or have any bearing on the Board's decision in the instant appeal.

TRANSMITTAL OF APPEAL BRIEF (Small Entity)	Docket No. 113737.7

In Re Application Of: **Gebhardt, et al.**

O I P E
APR 21 2006
PATENT & TRADEMARK OFFICE

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/031,542	January 18, 2002	Phillip A. Johnston	023973	2881	6594

Invention: **METHOD AND DEVICE FOR CLUSTER FRAGMENTATION**

COMMISSIONER FOR PATENTS:

Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed on:

February 21, 2006

☒ Applicant claims small entity status. See 37 CFR 1.27

The fee for filing this Appeal Brief is: **$250.00**

☒ A check in the amount of the fee is enclosed.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 50-0573. I have enclosed a duplicate copy of this sheet.

☐ Payment by credit card. Form PTO-2038 is attached.

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Signature

Dated: **April 21, 2006**

Matthew P. McWilliams
Drinker Biddle & Reath LLP
One Logan Square
18th & Cherry Streets
Philadelphia, PA 19103-6996
Phone: (215) 988-3381
Fax: (215) 988-2757
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Application No.	Filing Date	Examiner	Customer No.	Group Art Unit
10/031,542	January 18, 2003	Phillip A. Johnston	23973	2881

Invention: **METHOD AND DEVICE FOR CLUSTER FRAGMENTATION**

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One Logan Square
18th & Cherry Streets
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